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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/452,749	12/01/1999	ALEXANDRE M. ZAGOSKIN	M-7971-US	1708
20583	7590	10/20/2004	EXAMINER	
JONES DAY 222 EAST 41ST ST NEW YORK, NY 10017			WILLE, DOUGLAS A	
			ART UNIT	PAPER NUMBER
			2814	

DATE MAILED: 10/20/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

09/452,749

Applicant(s)

ZAGOSKIN, ALEXANDRE M.

Examiner

Douglas A Wille

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 12 August 2004.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-8, 11-18, 28, 30-39 and 42-65 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-8, 11-18, 28, 30-39, 42-65 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## **DETAILED ACTION**

### ***Claim Rejections - 35 USC § 103***

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1, 3 – 5, 28, 33, 34, 39, 54, 56, 58 and 60 – 63 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tinkham in view of Char et al.
3. With respect to claims 1, 3, 28, 33 and 39, Tinkham shows a representative small system, i.e. mesoscopic, made up of a small superconducting island connected to charge reservoirs (page 248 top paragraph) and further, a small superconducting island connected to two macroscopic superconducting leads (page 256, last full paragraph). Tinkham does not detail the materials of the island, the leads or the JJs. Char et al. show the formation of grain boundary JJs of high temperature superconductor material (see cover Figures and column 2, line 3 et seq.), which are d-wave materials and where an island 310 is connected to a body 312. It would have been obvious to use the Char et al. structure for the Tinkham device since it is known to be functional.
4. With respect to claims 1, 28, 39 and 60, it would be obvious to provide the best quality crystal structures since this is standard in semiconductor processing. Note that since Char et al. shows a grain boundary it would be obvious to provide a clean grain boundary since there is no function is provided by a non-clean boundary.
5. With respect to claims 4 and 5, Char et al. show d-wave materials.
6. With respect to claims 54, 56 and 58, the oppositely directed currents are inherent.

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7. With respect to claims 60 – 63, tunneling inherently occurs in a SQUID, supercurrents are inherent as are the corresponding states.

8. With respect to claim 34, it would have been obvious to use a metal as a weak link since it is known in the art and would be a design alternative.

9. Claim 2, 30, 31, 32 and 52 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tinkham in view of Char et al. and further in view of Shnirman et al.

10. With respect to claims 2, 30 and 31, Tinkham and Char et al. show the basic device and Shnirman et al. show the use of a SET to read out a JJ q-bit (see Figure 1 and page 57, second column et seq.) and provides a connection to ground. It would have been obvious to modify the Char et al. device to include the SET to provide a readout for the Tinkham and Char et al. device.

11. With respect to claim 52, the oppositely directed currents are inherent.

12. Claim 32 is rejected under the art shown above since it the devices are inherently parity keys.

13. Claims 6, 8, 35, 53, 55, 57, 59, 64 and 65 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tinkham in view of Char et al. and further in view of Baechtold et al.

14. With respect to claims 6, 8 and 35, Baechtold et al. show a binary circuit consisting of a series/parallel arrangement of JJs (see Figure 4 and column 5, line 57 et seq.). It would have been obvious to use the Tinkham and Char et al. structure in the Baechtold et al. device to provide the plurality of JJs. The Baechtold et al. structure as implemented by Tinkham and Char et al. will inherently provide multiple banks.

15. With respect to claim 53, 55, 57 and 59, the oppositely directed currents are inherent.

16. With respect to claim 64 it is known to use a magnetic field generator to affect the device.

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17. With respect to claim 65, it is known that a circulating supercurrent produces a magnetic field.

18. Claim 7, 11 – 18, 36, 37, 42, 43, 45, 46 and 48 - 50 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tinkham et al. in view of Char et al., Baechtold et al. and further in view of Shnirman et al.

19. With respect to claims 7, 11, 36, 37 and 43 it would have been obvious to use the Shnirman et al. structure to provide a readout for the device. Note that the SET provides a connection to ground.

20. With respect to claims 12 – 18, 42, 45, 46 and 48 - 50 it would be obvious to apply the structures described above in various combinations since the basic combination is shown and additional combinations would expand the usability of the device. This would be similar to combining basic normal devices (i.e. non-superconducting) such as FETs (field effect transistors) to provide complex circuit functions such as memories.

21. Claims 38, 44, 47 and 51 are rejected under the art shown above since the devices are inherently parity keys.

### ***Response to Arguments***

1. Applicant's arguments filed 8/12/04 have been fully considered but they are not persuasive.

2. Applicant argues the quality of the Char et al. grain boundary but note that Char et al. teach a grain boundary and the quality of the grain boundary, as fabricated by Char et al. has no bearing on the validity of the claimed structure. The Char et al. invention could be disputed if it

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could be shown that the invention could not work and is thus inoperative. Since no such showing can be made the grain boundary of Char et al. shows the limitations claimed.

3. Applicant argues that there is no reason to combine but note that Tinkham shows a Josephson junction without specifying the junction and Char et al. show a method of forming a Josephson junction. Thus the two references are properly combined.

4. Applicant states that quantum tunneling is not the same as what occurs in a SQUID. But tunneling is a quantum effect where ever it occurs.

#### ***Conclusion***

5. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

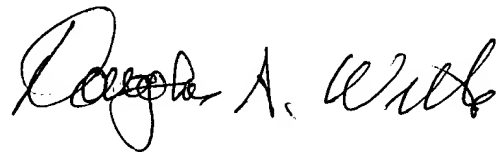
A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Douglas A Wille whose telephone number is (571) 272-1721. The examiner can normally be reached on M-F (6:15-2:45).

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wael Fahmy can be reached on (571) 272-1705. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 872-9306 for regular communications and (703) 872-9306 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

A handwritten signature in black ink, appearing to read "Douglas A. Wille". The signature is stylized with a large, looped initial "D" and a cursive "Wille".

Douglas A. Wille  
Primary Examiner